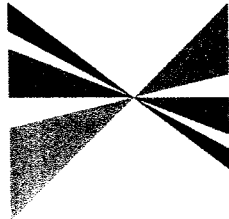


**FINAL  
CALTRANS  
TRANSPORTATION CONTROL MEASURE (TCM)  
SUBSTITUTION REPORT**

February 12, 2007

SOUTHERN CALIFORNIA



**ASSOCIATION of  
GOVERNMENTS**

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## **INTRODUCTION**

The Southern California Association of Governments (SCAG) is the designated Metropolitan Planning Organization (MPO) for six counties in Southern California, Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura. As the MPO, SCAG is required to develop and update the Regional Transportation Plan (RTP) and the Regional Transportation Improvement Program (RTIP). The RTP is a long-range plan that identifies multi-modal regional transportation needs and investments over the next 25 years. The RTIP is a short-range program that implements the long-range plan by identifying federal, state, and local funding sources and amounts for specific transportation projects and project phases.

SCAG adopted the current operating 2004 RTP on April 1, 2004 (resolution #04-451-2), and the current operating 2006 RTIP on July 27, 2006 (resolution #06-477-2). Both the RTP and RTIP were developed in a comprehensive, cooperative, and continuing process that involved a broad spectrum of transportation and related stakeholders, as required under the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21).

The California Department of Transportation (Caltrans) has requested that SCAG amend the 2006 RTIP to replace an existing full time High Occupancy Vehicle (HOV) lane with a part time HOV lane (see Attachments A, B). The operational change would last for a period of three years after which time the HOV would revert back to full time.

The HOV lane is designated as a Transportation Control Measure (TCM) for ozone in the Air Quality Management Plan (AQMP) for the South Coast Air Basin. The purpose of this document is to identify the specific details of the proposed TCM substitution and associated amendment to the 2006 RTIP and to ensure that the proposed changes are consistent with federal and state requirements, including the Clean Air Act (CAA) section 176(c) as revised by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). All analyses for both the 2004 RTP and 2006 RTIP are incorporated into this document.

## **PROJECT DESCRIPTION**

Caltrans is proposing to convert an existing full time HOV lane to a part time lane in both directions on an eight mile segment of the SR-60. The proposed segment would begin just east of the SR-60 and Interstate 215 junction and would continue to Redlands Boulevard. The conversion would last for a period of three years at which time it will revert back to a full time HOV lane. As proposed, the HOV lane would be HOV only from 6 AM through 10 AM and from 3 PM through 7 PM and would be open to single occupant vehicles the remaining hours of the day. Signage will be installed to inform motorists of the new hours of operation. No additional changes (striping, ingress/egress, etc.) are proposed.

Riverside County Transportation Commission (RCTC), in conjunction with Caltrans, is providing the following projects to be combined with the part time HOV as the formal substitution package:



- Freeway Service Patrol expansion: add to network of privately owned tow trucks to remove disabled vehicles in congested areas. Two additional vehicles on route 60 from Main to Milliken
- New Freeway Service Patrol: to remove disabled vehicles in congested areas. Two vehicles on a new FSP beat; I-215 between Alessandro to SR-74.

#### Timely Implementation of TCMs

Substitution of the full time SR-60 HOV lane TCM must follow the substitution process specified in the CAA section 176(c) as amended by SAFETEA-LU. The CAA as amended requires that the replacement TCM meet the following criteria:

- |                       |  |
|-----------------------|--|
| 176(c)(8)(A)(i)       | The substitute measure achieves equivalent or greater emissions reductions than the control measure to be replaced;  |
| 176(c)(8)(A)(ii)      | The substitute control measures are implemented in accordance with a schedule that is consistent with the schedule provided for the control measures in the implementation plan;   |
| 176(c)(8)(A)(iii)     | The substitute and additional control measures are accompanied with evidence of adequate personnel and funding and authority under state or local law to implement, monitor, and enforce the control measure;  |
| 176(c)(8)(A)(iv)(I)   | The substitute and additional control measures were developed through a collaborative process that included participation by representatives of all affected jurisdictions (including local air pollution control agencies, the state air pollution control agency and state and local transportation agencies); |
| 176(c)(8)(A)(iv)(II)  | The substitute and additional control measures were developed through a collaborative process that included consultation with the Administrator;   |
| 176(c)(8)(A)(iv)(III) | The substitute and additional control measures were developed through a collaborative process that included reasonable public notice and opportunity for comments; and   |
| 176(c)(8)(A)(v)       | The metropolitan planning organization, state air pollution control agency and the Administrator concur with the equivalency of the substitute or additional control measure.  |

TCMs are contained in Appendix IV-C of the Air Quality Management Plan/State Implementation Plan (AQMP/SIP). The TCM substitution process followed by SCAG is also spelled out in this appendix to the 1994, 1997 and 2003 AQMPs. The AQMP specifies procedures for replacing individual projects such as the HOV full time to part time replacement. This process includes:

- The CTCs and/or project sponsors shall notify SCAG when a TCM project cannot be delivered or will be significantly delayed.
- SCAG, CTC or project sponsor can propose a substitute measure.
- Prior to adopting an individual TCM substitution, the measure must have been subject to interagency consultation (i.e., the Transportation Conformity Working Group), public review and comment period and emissions analysis.



- The replacement measure must be subject to the SCAG Regional Council review and adoption.
- Upon adoption by the Regional Council, the new measure will replace the previous measure and will be incorporated into the RTIP through an administrative amendment.
- Adoption by SCAG's Regional Council will rescind the previous TCM and apply the new measure.

*Interagency Consultation.* Interagency consultation occurred at SCAG's publicly noticed Transportation Conformity Working Group meeting on November 28, 2006 and January 30, 2007.

*Equivalent Emissions Reduction.* As demonstrated, the proposed TCM replacement, which includes the part time HOV and the projects proposed by RCTC, provides emission reductions greater than or equal to those of the original TCM.

*Similar Geographic Area.* The replacement projects are located in the same geographic area as the full time HOV lane and would serve Riverside County and the surrounding areas.

*Full Funding.* The signage associated with the full time to part time HOV conversion will be funded with \$35,000 in Minor State Cash. The RCTC projects will be funded with State funds and local SAFE funds.

*Similar Time Frame.* The part time HOV project is anticipated to be operational in mid 2007 and will remain in use for a period of three years. The two FSP expansion projects will be operational by mid-2007. As permanent projects they will continue to provide air quality benefits beyond the three year time frame of the part time HOV.

*Timely Implementation.* The replacement projects will be monitored through TCM Timely Implementation Reports that SCAG submits to the federal agencies (FHWA).

*Legal Authority.* Caltrans will have full legal authority to implement and operate the part time HOV project. RCTC has full legal authority to implement the additional proposed projects.

*SCAG Review and Adoption.* After Committee approval, the replacement TCM will be presented to SCAG's Regional Council for adoption.

**Finding:** SCAG has followed the federally approved process for TCM substitution as described in this document. Substitution of this project does not change funding and timely implementation of any TCM projects not described in this document. With EPA concurrence, all South Coast Air Basin TCM projects in the federally approved conforming 2004 RTP and 2006 RTIP are given funding priority and are on schedule for implementation.

#### Fiscal Constraint Analysis

**Finding:** All projects listed in the 2004 RTP and 2006 RTIP are financially constrained for all fiscal years.



Interagency Consultation and Public Involvement Analysis

**Finding:** SCAG has consulted with the respective transportation and air quality planning agencies. The proposed substitution of the SR-60 HOV lane replacement was discussed at the Transportation Conformity Working Group (which includes representatives from the respective air quality and transportation planning agencies) on November 28, 2006 and January 30, 2007. In addition, the proposed substitution will undergo the required consultation and public participation process. A 30 day public comment period announcement was posted on SCAG's website in early January.

**EMISSIONS ANALYSIS**

The SR-60 HOV lane TCM and the proposed SR-60 HOV part time TCM replacement project are compared by difference in emissions. Emissions estimations are for the year 2007. Additional technical information is included in Attachment B.

Table 1                      **Project Emissions (tons/day)**

		<b>VMT</b>	<b>ROG</b>	<b>NOx</b>
Original Project	Full time HOV lane	367,762	261.30	487.32
Replacement Project	Part time HOV lane	367,761	261.31	487.36
Emissions Difference			0.01	0.04

Notes: VMT x 1000; EMFAC2002; Year 2007; SCAG system-wide modeling statistics.

Table 2 demonstrates the additional emissions reductions that would be achieved by including the two additional Riverside County projects. Emission findings for the RCTC projects were supplied by RCTC's air quality consultant (see Attachment C for more Information). Due to the small quantity of emissions, emissions information for the projects is expressed in pounds per day rather than tons per day (the total is expressed in tons per day).

Table 2                      **Emission Reductions (pounds/day)**

	<b>ROG</b>	<b>NOx</b>
FSP Expansion	383.9	75.2
FSP New Route	383.9	75.2
Total (tons/day)	0.38	0.08

Gorski, Raymond (February 9, 2007), An Assessment of the Transportation Control Measure Replacement Projects to Offset State Route 60 High Occupancy Vehicle (HOV) Facility Emissions

As demonstrated in Tables 1 and 2, the proposed part time HOV lane, combined with the projects proposed by RCTC, would provide greater emission reductions than the full time HOV.



**Finding:** The proposed part time HOV lane when combined with the proposed RCTC projects would provide greater emission reductions than the original TCM.

## **PUBLIC REVIEW AND COMMENT**

The TCM substitution process as described in the CAA section 176(c) requires public notice and opportunity for comment. A Notice of Availability was posted on the SCAG website ([www.scag.ca.gov](http://www.scag.ca.gov)) on January 11, 2007. A revised report including additional project information was posted on SCAG's website on January 23, 2007. The Notice of Availability was also published in a local Riverside County paper, The Riverside Enterprise Press. A summary of the comments received and responses is included in Attachment D.



**ATTACHMENT A**

**CALTRANS REQUEST FOR TCM SUBSTITUTION**



*Flex your power!  
Be energy efficient!*

**DEPARTMENT OF TRANSPORTATION****ENVIRONMENTAL ENGINEERING**

Tony Louka, Office Chief, Environmental Engineering

54 West 4<sup>th</sup> Street, 8<sup>th</sup> Floor (M.S. 824)

San Bernardino, CA 92401-1400

PHONE (909) 383-6385

FAX (909) 383-6494

TTY (909) 383-6300

December 7, 2006

Mr. Hasan Ikhata

SCAG

818 West Seventh St., 12<sup>th</sup> Fl.

Planning & Policy

Los Angeles, CA 90017-3435

**Subject: Caltrans Part-time HOV TCM Substitution on Route 60 in the City of  
Moreno Valley**

Dear Mr. Ikhata:

Caltrans is submitting a TCM Project substitution request for the existing full-time HOV lane on Route 60 in the City of Moreno Valley.

The purpose of the project is to get better utilization of the HOV lanes during off-peak periods. The existing configuration of two mixed flow lanes plus one HOV does not operate as efficient as possible. Off-peak Single Occupancy Vehicles (SOVs) are forced to use the capacity in the two available mixed flow lanes, which increases the vehicle density of these lanes. The HOV lane is left underutilized.

As a suitable substitute, we are submitting a part-time HOV to operate from 6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM. Allowing SOVs to use the HOV lane during off-peak hours will reduce the density of the facility, and provide larger headways in the right lane. This will allow for smoother merges at interchanges, which will increase the overall speed of vehicles on this segment. It will also leave the HOV lane available for use during lane restrictions such as accidents.

Presently, the part-time HOV is not programmed in the RTIP, however we have placed an amendment to include it in RTIP.

If you have any questions, please call me at (909) 383-6385. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Tony Louka".

Tony Louka,  
Chief, Office of  
Environmental Engineering

*"Caltrans improves mobility across California"*

Mr. Hasan Ikhata  
December 7, 2006  
Page 2

cc: Jessica Kirchner (SCAG)  
Jonathan Nadler (SCAG)  
Sylvia Patsouras (SCAG)  
Mike Perovich (Caltrans)  
Ernie Figueroa (Caltrans)  
Tom Ainsworth (Caltrans)  
Jamal Elsaleh (Caltrans)  
Syed Raza (Caltrans)

**ATTACHMENT B**

**CALTRANS TCM REPLACEMENT REPORT**

**Riverside County Transportation Control Measure Replacement**

**Presented to**

**Southern California Association of Governments**

**Submitted by**

**Caltrans District 8  
464 West Street  
San Bernardino, Ca. 92401-1400**

**November 16, 2006**

# **Riverside County Transportation Control Measure Replacement**

## **I Introduction**

Caltrans plans to replace an existing Transportation Control Measure (TCM) with a new TCM project that provides equivalent or greater emissions reductions, while meeting all TCM substitution requirements specified in The Clean Air Act's section 176(c) transportation conformity provisions, including procedures to use in substituting or adding TCMs to approved SIPs.

The replacement will be discussed in this technical report:

**SR-60 HOV.** On an eight-mile segment of State Route 60 (SR 60) East of Junction for SR 60/ I-215 to Redlands Blvd., convert the existing full-time (24 hrs) High Occupancy Vehicle (HOV) lane to a part-time HOV lane in both directions.

The following report presents the criteria for TCM replacement that apply to the SR-60 HOV lane TCM. Further the report includes a description of the TCM project to be replaced, the need for replacement, the implication of the replacement on the Regional Transportation Improvement Program (RTIP), and a description of the proposed replacement project. The technical analysis for the replacement presents emissions data for the original and replacement TCM.

## II TCM Replacement Procedures and Requirements

Replacement of SR-60 HOV lane with a new TCM must follow the substitution protocol specified in the Clean Air Act's section 176(c).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, signed into law on August 10, 2005, revised the Clean Air Act's section 176( c) transportation conformity provisions, including procedures to use in substituting or adding TCMs to approved SIPs. The Clean Air Act as amended requires that the replacement TCM have the following:

- 176(c)(8)(A)(i) The substitute measures achieve equivalent or greater emissions reductions than the control measure to be replaced;
- 176(c)(8)(A)(ii) The substitute control measures are implemented in accordance with a schedule that is consistent with the schedule provided for the control measures in the implementation plan;
- 176(c)(8)(A)(iii) the substitute and additional control measures are accompanied with evidence of adequate personnel and funding and authority under State or local law to implement, monitor, and enforce the control measures;
- 176(c)(8)(A)(iv)(I) The substitute and additional control measures were developed through a collaborative process that included participation by representatives of all affected jurisdictions (including local air pollution control agencies, the State air pollution control agency, and State and local transportation agencies);
- 176(c)(8)(A)(iv)(II) The substitute and additional control measures were developed through a collaborative process that included consultation with the Administrator;
- 176(c)(8)(A)(iv)(III) The substitute and additional control measures were developed through a collaborative process that included reasonable public notice and opportunity for comments; and
- 176(c)(8)(A)(v) The metropolitan planning organization, State air pollution control agency, and the Administrator concur with the equivalency of the substitute or additional control measures.

The AQMP specifies procedures for replacing individual projects such as the SR-60 HOV lane:

- The CTCs and/or project sponsors shall notify SCAG when a TCM project cannot be delivered or will be significantly delayed.
- SCAG, CTC or project sponsor can propose a substitute measure.
- Prior to adopting an individual TCM substitution, the measure must have been subject to interagency consultation (via the Transportation Conformity Working Group), public review and comment period and emissions analysis.
- The replacement measure must be subject to the SCAG Regional Council review and adoption.
- Upon adoption by the Regional Council, the new measure will replace the previous measure and will be incorporated into the RTIP through an administrative amendment.
- Adoption by SCAG's Regional Council will rescind the previous TCM and apply the new measures.

Section III of this report includes a summary of the SR-60 HOV lane replacement TCM fit with each of the requirements established by the AQMP.

### **III SR-60 HOV Lane TCM Replacement**

**SR-60 HOV Lane Description.** The proposed project is a TCM replacement project and is substituting, an already built TCM, the existing full-time HOV lane. The existing project is an approved TCM in the SIP, which opened to traffic in March 2004 as a full-time HOV operation.

**Need for SR-60 HOV Lane Project Replacement.** The 2006 traffic study prepared by Caltrans indicates that the full-time HOV lane is under-utilized during the off-peak hours by 40% to 50%. The purpose of converting the existing full-time HOV lane to part-time HOV lane is to relieve the congestion, increase the travel speed, and improve overall safety by lowering the traffic densities during off-peak hours on the mixed flow lanes.

**Implication of SR-60 HOV Lane Project Replacement for 2006 RTIP.**  
The SR60 HOV lane project was included in the 2002 RTIP as follows:

RCTC 46360

In Riverside and Moreno Valley  
On R60 from RT 215 to Redlands  
Blvd. Add 2 HOV lanes.

At the conclusion of the interagency consultation process, Caltrans will request that SCAG amend the 2006 RTIP to designate the part-time HOV project as a TCM.

The replacement project will also subsequently be included in annual TCM Timely Implementation Reports that SCAG submits to FHWA to demonstrate that the projects are being implemented on time in fulfillment of the AQMP TCM requirements.

#### **Recommended SR-60 HOV Lane Replacement Project**

Caltrans proposes to convert the existing full-time HOV lane to a part-time HOV lane in both directions on an eight-mile segment of SR-60, East of junction of SR-60/I-215 (R12.2) to Redlands Boulevard (PM 20.4). The conversion will be for a period of three years at which time it will revert back to a full-time HOV lane. The hours of HOV operation will be from 6 A.M. to 10 A.M. and 3 P.M. to 7 P.M. in both directions of SR-60. The HOV lane will be open to use by single occupant vehicles (SOV) for the remaining hours of the day. A striped buffer between the HOV lane and the mixed-flow lanes will remain unchanged, and no striping modifications are proposed. The SOVs will be able to enter/exit the HOV lanes only at the existing designated ingress and egress locations. New signs will be installed informing motorists about the hours of HOV operation. An aggressive public awareness campaign will be launched to spread the word about the proposed change in operation. Refer to figures 1 and 2 for the project vicinity and location map.

## **Technical Analysis**

This technical analysis documents the evidence that the SR-60 HOV lane project replacement TCM meets the substitution criteria spelled out in the Clean Air Act's section 176(c): equivalent emissions, similar geographic service area, similar implementation schedule, and demonstrated financial commitment to complete the project on time. The modeling procedure identified below was used for the SR-60 HOV lane replacement modeling.

**Methodology for Analyzing Original Project and Replacement.** The SR-60 HOV lane TCM and the proposed SR-60 part-time TCM Replacement project are compared in terms of difference in emissions. The emission factors for vehicle type is based on EMFAC2002, Version V2.2 and the emissions estimation are for the year 2007.

**Emission Analysis.** Based on the results of the modeling described above, Table 1 compares the existing HOV Operation and the proposed replacement TCM project emission profiles for year 2007. The SCAG's findings after model runs are as follows: *"Results from the base model run (with existing HOV) and the alternative model run (with HOV conversion) were compared and analyzed. Overall the HOV conversion had very little effect on corridor level traffic volumes. There are some diversions of SOVs to the converted HOV lane, but the overall freeway volume showed little change. Also, there are no significant changes in the freeway or HOV speeds between the base and alternative model run. Regional emissions showed insignificant differences between the base and alternative scenarios."*

**Geographic Area/Service Area/Accessibility.** The replacement project in the City of Moreno Valley serves and provides accessibility in the same corridor as the original TCM.

**Implementation Schedule.** The replacement project will be added to the RTIP through a formal amendment to be approved by SCAG's Regional Council.

**Financial Commitment.** The \$35,000 replacement project will be funded with Minor State Cash.

**TABLE 1: 2007 Air Quality Emissions Comparison of Existing HOV and Part-time HOV Replacement TCM on SR-60 in Moreno Valley**

(VMT in 1000s, emissions in tons/day)

Existing HOV Operation:	**VMT	***ROG	CO	NOx	PM10	SOx	Direct PM2.5 (Annual)
LDV+MDV	342,781	228.17	2,331.38	205.26	15.14	1.86	9.6
HDT	22,043	28.93	194.45	256.1	5.42	0.36	4.46
Others*	2,938	4.2	58	25.96	0.55	0.04	0.45
<b>Sum</b>	<b>367,762</b>	<b>261.3</b>	<b>2,583.83</b>	<b>487.32</b>	<b>21.11</b>	<b>2.26</b>	<b>14.51</b>
<b>Part-time HOV Replacement:</b>							
LDV+MDV	342,781	228.18	2,331.59	205.27	15.14	1.86	9.61
HDT	22,042	28.93	194.47	256.14	5.42	0.36	4.46
Others*	2,938	4.2	58	25.96	0.55	0.04	0.45
<b>Sum</b>	<b>367,761</b>	<b>261.31</b>	<b>2,584.06</b>	<b>487.37</b>	<b>21.11</b>	<b>2.26</b>	<b>14.52</b>

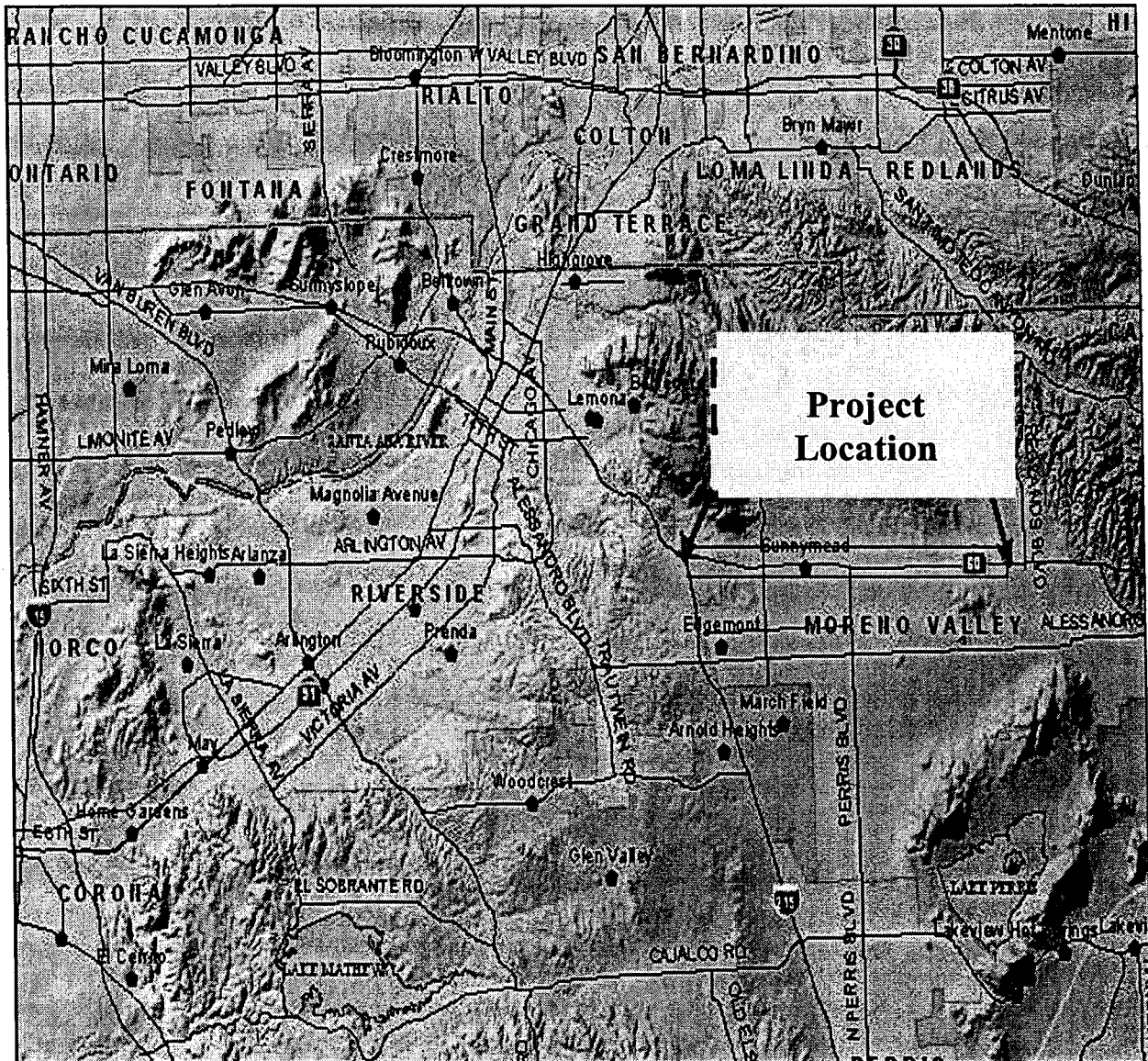
Note:

\*Others – include Line Haul vehicles, motor homes, school buses, and urban buses.

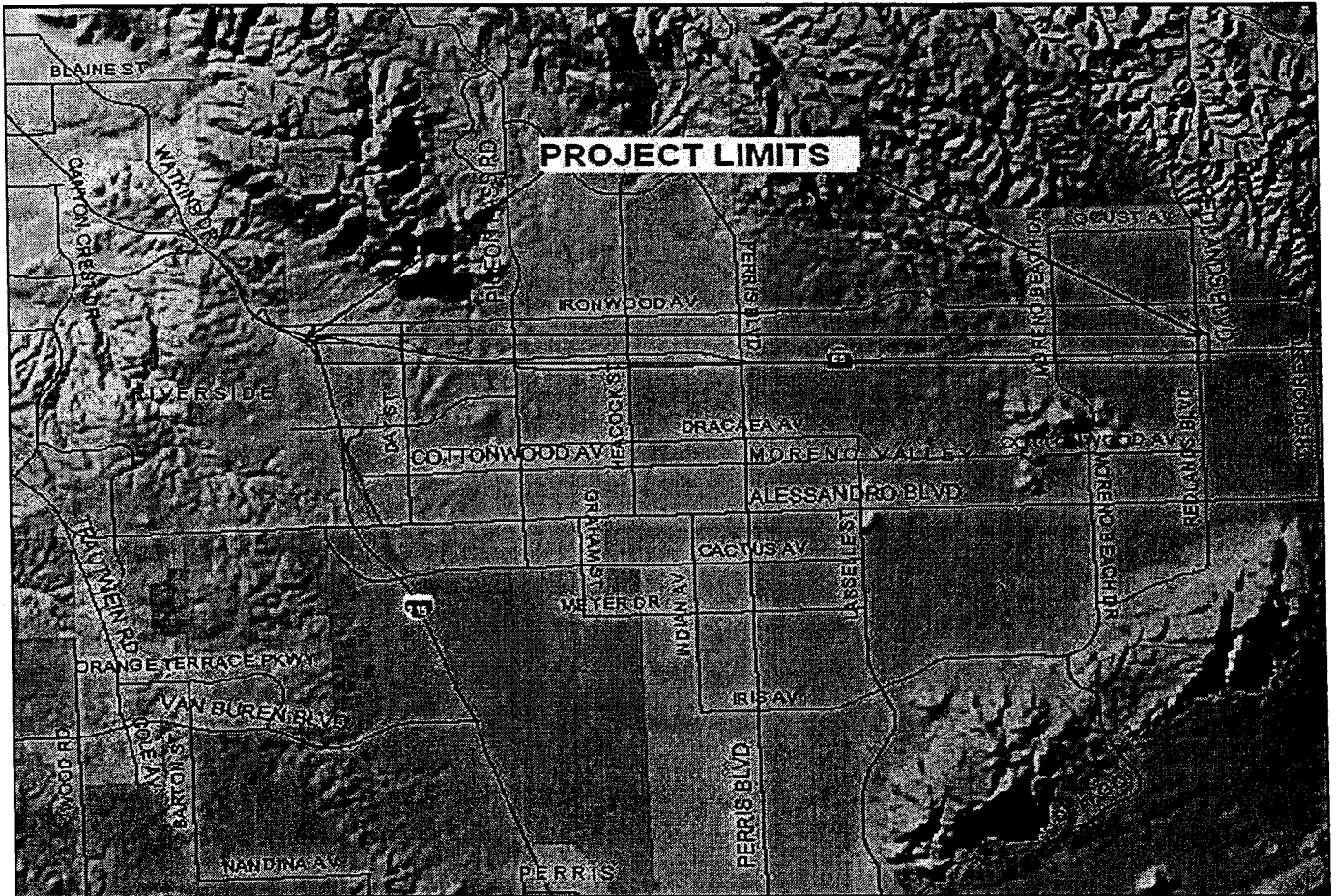
\*\*VMT X 1000

\*\*\*Pollutants in tons – South Coast Air Basin. Emissions factors applied in the modeling were based on EMFAC2002, LDV (light duty vehicle); MDV (medium duty vehicle); HDV (heavy duty vehicle).

**FIGURE 1: Project Vicinity Map**



**FIGURE 2: Project Location Map**



## Summary of SR-60 HOV Lane TCM Replacement

The purpose of this TCM replacement is to substitute an existing full-time HOV project on State Route 60 in Moreno Valley with a part-time HOV project. The conversion will be for a period of three years at which time it will revert back to a full-time HOV.

- **SCAG Review and Adoption.** The replacement TCM will be presented to SCAG's Transportation and Communications Committee in the form of a RTIP Amendment supported by emissions modeling and a conformity finding for its recommendation. The meetings will be publicly noticed. A 30-day public comment period and public hearing is included.
- **Interagency Consultation.** Interagency Consultation is occurring at SCAG's publicly noticed Transportation Conformity Working Group meeting on November 28, 2006.
- **Equivalent Emission Reductions.** The part-time HOV project virtually shows no significant difference in emissions from the existing full-time HOV for ROG, NOx, CO AND PM10 as supported with emission model runs.
- **Similar Geographic Area.** The replacement project in the City of Moreno Valley serves and provides accessibility in the same corridor as the original TCM.
- **Full Funding.** The \$35,000 replacement project will be funded with Minor State Cash.
- **Time Frame.** The replacement project (the part-time HOV) will be completed and in operation by June 2007.
- **Legal Authority.** Caltrans has full legal authority to construct and operate the replacement project.
- **Implementation Commitment.** The replacement project will be added to the RTIP through a formal amendment to be approved by SCAG's Regional Council.
- **AQMP – Consistency Methodology.** The methodology for analyzing emissions used AQMP – consistent assumptions and modeling techniques.
- **Latest Planning Assumptions.** Technical analysis of the replacement project was based on EMFAC2002 emission factors version V2.2. The emissions estimation is for the year 2007.

**ATTACHMENT C**

**RCTC REPLACEMENT PROJECTS EMISSIONS REPORT**

# **An Assessment of Transportation Control Measure Replacement Projects to Offset State Route 60 High Occupancy Vehicle (HOV) Facility Emissions**

***Prepared for:***

***Riverside County Transportation Commission***

***Prepared by:***

***Raymond J. Gorski***

***February 9, 2007***

Date: February 9, 2007

To: Shirley Medina

From: Ray Gorski

Subject: Air Quality Assessment for SR-60 High Occupancy Vehicle Facility TCM Replacement Projects

Introduction: The Southern California Association of Governments (SCAG) has performed an assessment of the air quality impacts of modifying the HOV lane access requirements on a segment of State Route 60 in Riverside County. The HOV facility would allow mixed flow access on a part-time basis. SCAG's air quality analysis has yielded the following criteria pollutant shortfalls:

*Table 1: SR-60 Part-time HOV Facility Criteria Pollutant Shortfalls*

Criteria Pollutant	Full-Time HOV (tons/day)	Part-Time HOV (tons/day)	Emissions Shortfall	
Oxides of Nitrogen (NO <sub>x</sub> )	487.32	487.36	0.04 ton/day	80 pounds/day
Carbon Monoxide (CO)	2,583.83	2,584.02	0.19 ton/day	380 pounds/day

These shortfall amounts equate to 80 pounds per day of excess NO<sub>x</sub> emissions and 380 pounds per day of carbon monoxide emissions. To offset these shortfalls, RCTC has selected additional transportation control measure projects to be implemented within Riverside County.

Projects Proposed to Eliminate Emissions Shortfall: The following projects have been selected by RCTC to mitigate the projected emissions shortfall:

- Freeway Service Patrol Expansion – State Route 60 Main Street to Milliken Avenue;
- Implementation of New Freeway Service Patrol Beats – Interstate 215 Alessandro to State Route 74.

An air quality assessment was performed to quantify the emission reductions attributable to each project. Each project was assessed using analysis methodologies approved by Caltrans and the California Air Resources Board; these analytic tools are referenced within the discussion of each individual project.

**Project #1: Freeway Service Patrol Expansion** – RCTC, the Service Authority for Freeway Emergencies (SAFE) authority for Riverside County, is expanding the existing State Route 60 beat with two (2) additional service vehicles. The beat operates on the SR-60 between Main Street and Milliken Avenue. The Riverside FSP Program is jointly administered by the California Department of Transportation (Caltrans), the California Highway Patrol (CHP), and the RCTC.

Freeway congestion has become a regular part of the daily commute for thousands of Southern Californians. Congestion not only contributes to motorist stress and inconvenience, but also adversely impacts Southern California's air quality and economic viability. Congestion increases vehicle idling, results in frequent acceleration and deceleration due to stop and go conditions, and significantly increases fuel consumption. These vehicle operating conditions are directly related to higher overall emission rates.

Freeway Service Patrol (FSP) is an incident management measure designed to assist disabled vehicles along congested freeway segments, relieving peak period non-recurrent congestion through the quick detection, verification, and removal of freeway incidents.

There are two fundamental types of freeway congestion: recurrent and non-recurrent. Recurrent congestion occurs when demand exceeds roadway capacity. This typically occurs during peak traffic periods. Non-recurrent freeway congestion is caused by incidents, unforeseeable events such as automobile collisions, vehicle breakdowns, or debris in the roadway. In Southern California, non-recurrent congestion is estimated to account for approximately one-half of all freeway congestion.

There are also two types of FSP deployment; the "Roving FSP, where a fleet of dedicated tow trucks patrol the major freeway corridors. Typically in service during the a.m. and p.m. peak periods, the roving FSP units clear disabled vehicles and accidents by fixing minor problems or by towing a vehicle off of the freeway. A second deployment strategy for FSP is "dispatched FSP". Dispatched FSP units are staged in various locations along a corridor and directed to an incident by a central Traffic Management Center. As discussed below, studies conducted by the University of California, Davis, and University of California, Berkeley, indicate that the roving FSP offers significantly greater effectiveness as a congestion mitigation and air quality strategy as compared to a dispatched FSP. *The RCTC FSP expansion project discussed herein utilizes "roving" FSP tow vehicles.*

Technical Approach for the Quantification of Emissions Reductions: The FSP evaluation methodology used to quantify emission reductions attributable to an FSP beat is based on a computer model developed by the University of California at Berkeley. Named FSP Evaluation (FSPE), the simulation assesses beats with respect to three (3) quantitative Measures of Effectiveness (MOE), including incident delays, fuel consumption, and air pollutant emissions. In addition to model development, the UC Berkeley serves as the principal contractor to Caltrans to perform independent beat analysis for all FSP programs in California.

The three criteria pollutants included quantified in the FSPE are reactive organic gases (ROG), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO). FSPE is comprised of two integrated models, FSPE, the evaluation model, and FSPP, the beat "predictor" model. FSPE is primarily used to evaluate the effectiveness of an existing beat; FSPP is used to determine the probability that a proposed beat has merit and should be considered for implementation.

The new beat proposed by RCTC on the SR-60 between Main Street and Milliken Avenue has not yet undergone evaluation by UC Berkeley on behalf of Caltrans. Thus, the quantification of air pollutant reductions is pending. However, UC Berkeley has evaluated and published the

results of their independent evaluation of similar FSP beats in the Riverside area. Thus, for the purpose of this assessment, the emission reduction benefits attributable to the newly proposed beat are based on an assessment of comparable existing beats in Riverside County. These comparable beats have undergone assessment by UC Berkeley on behalf of Caltrans.

**Emissions Factors:** The air quality benefits element of the UC Berkeley FSPE utilizes emission factors as a function of vehicle speed are published by the California Air Resources Board and Caltrans. These factors are derived using CARB's EMFAC 2003 simulation, and are statewide fleet averages. Emission factors for reactive organic gases (ROG) and oxides of Nitrogen (NO<sub>x</sub>) are included in Table 4 of the ARB publication *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects* cited above. Emission factors by vehicle speed for carbon monoxide (CO) are included in Table 4A. Particulate Matter (PM<sub>10</sub>) emissions are assumed by CARB to be constant across vehicle speeds and equal approximately 0.45 gram per vehicle mile traveled. For purposes of assessing emissions reductions attributable to deployment of FSP; therefore, PM<sub>10</sub> emissions will not be considered.

**Emission Reductions Attributable to Comparable FSP Beats in Riverside County** – The following Tables are published results of evaluations for FSP beats operating in Riverside County. This assessment assumes the emission reductions attributable to the proposed beat will be equal to or greater than the average for all beats in Riverside County. Due to the proposed location of the expanded FSP service, it is anticipated that the actual air quality benefits of the proposed project will exceed the Riverside County average:

*Table 2: Comparable FSP Beat in Riverside County – SR-91*

Input Data				FSP Operational Parameters			
District	8			Delay Cost (\$/veh-hr)	\$ 10.00		
Analyst	J. Rivera, RCTC			Fuel Cost (\$/gal)	\$ 2.00		
Date	March 27, 2006			Mean Response time w/o FSP (min)	30.0		
Beat #, Name	1			FSP Response Time (min)			
Beat Description	SR-91 (0.00 – 5.50 PM)			AM Peak	3.3		
Beat Length (miles)	5.50			Midday			
	Start	End	# FSP	PM Peak	3.3		
Hours of Operation/ # FSP trucks	Time	Time	Trucks	FSP Response Time Reduction (min)			
AM Peak	5:00	8:30	2	AM Peak	26.7		
Midday				Midday			
PM Peak	15:00	19:00	2	PM Peak	26.7		
Number of Service Days/Yr	253			Traffic Profile	User Defined		
Cost of FSP Service (\$/truck-hr)	\$ 43.09						
Total FSP Assists (Incidents/yr)	5,042						
Time Period				Daily/Annual			
Savings-Performance Measures	AM Peak	Midday	PM Peak	Savings-Performance Measures	Daily	Annual	
Delay (veh-hrs)	86.0		311.9	Delay (veh-hrs)	397.95	100,681	
Fuel Consumption (gal)	129.7		470.5	Fuel Consumption (gal)	600.28	151,870	
Emissions				Emissions			
ROG (kg/day)	12.87		46.66	ROG (kg/day, kg/yr)	59.52	15,059	
CO (kg/day)	0.54		1.96	CO (kg/day, kg/yr)	2.50	631	
NOx (kg/day)	2.52		9.14	NOx (kg/day, kg/yr)	11.67	2,951	
Cost Effectiveness				Cost Effectiveness			
Delay Benefits (\$/day)	\$ 860		\$ 3,119	Delay Benefits (\$/day, \$/yr)	\$ 3,979	1,006,812	
Fuel Benefits (\$/day)	\$ 259		\$ 941	Fuel Benefits (\$/day, \$/yr)	\$ 1,201	303,740	
Total Benefits (\$/day)	\$ 1,120		\$ 4,060	Total Benefits (\$/day, \$/yr)	\$ 5,180	\$ 1,310,552	
Cost of the FSP Service	\$ 302		\$ 345	Cost of the FSP Service	\$ 646	\$ 163,520	
B/C Ratio(s)	3.71		11.78	B/C Ratio	8.01		

*Table 3: Comparable FSP Beats in Riverside County – SR-91*

Input Data				FSP Operational Parameters		
District	8			Delay Cost (\$/veh-hr)	\$	10.00
Analyst	J. Rivera, RCTC			Fuel Cost (\$/gal)	\$	2.00
Date	March 27, 2006			Mean Response time w/o FSP (min)		30.0
Beat #, Name	2			FSP Response Time (min)		
Beat Description	SR-91 (5.50 – 11.09)			AM Peak		3.4
Beat Length (miles)	5.59			Midday		
Hours of Operation/ # FSP trucks	Start Time	End Time	# FSP Trucks	PM Peak		3.4
	AM Peak	5:00	8:30	2		
	Midday					
PM Peak	15:00	19:00	2	FSP Response Time Reduction (min)		
Number of Service Days/Yr	253			AM Peak		26.6
Cost of FSP Service (\$/truck-hr)	\$	48.84		Midday		
Total FSP Assists (Incidents/yr)	3,255			PM Peak		26.6
				Traffic Profile	User Defined	
Time Period				Daily/Annual		
Savings-Performance Measures	AM Peak	Midday	PM Peak	Savings-Performance Measures	Daily	Annual
Delay (veh-hrs)	20.0		96.9	Delay (veh-hrs)	116.89	29,573
Fuel Consumption (gal)	30.1		146.2	Fuel Consumption (gal)	176.32	44,609
Emissions				Emissions		
ROG (kg/day)	2.99		14.50	ROG (kg/day, kg/yr)	17.48	4,423
CO (kg/day)	0.13		0.61	CO (kg/day, kg/yr)	0.73	185
NOx (kg/day)	0.59		2.84	NOx (kg/day, kg/yr)	3.43	867
Cost Effectiveness				Cost Effectiveness		
Delay Benefits (\$/day)	\$	200	\$	969	\$	1,169
Fuel Benefits (\$/day)	\$	60	\$	292	\$	353
Total Benefits (\$/day)	\$	260	\$	1,262	\$	1,522
Cost of the FSP Service	\$	342	\$	391	\$	733
B/C Ratio(s)	0.76		3.23	B/C Ratio	2.08	

Input Data				FSP Operational Parameters		
District	8			Delay Cost (\$/veh-hr)	\$	10.00
Analyst	J. Rivera, RCTC			Fuel Cost (\$/gal)	\$	2.00
Date	March 27, 2006			Mean Response time w/o FSP (min)		30.0
Beat #, Name	4			FSP Response Time (min)		
Beat Description	SR-91 (11.09 – 21.64)			AM Peak		3.2
Beat Length (miles)	10.55			Midday		
Hours of Operation/ # FSP trucks	Start Time	End Time	# FSP Trucks	PM Peak		3.2
	AM Peak	5:30	8:30	4		
	Midday					
PM Peak	15:00	19:00	4	FSP Response Time Reduction (min)		
Number of Service Days/Yr	253			AM Peak		26.8
Cost of FSP Service (\$/truck-hr)	\$	49.84		Midday		
Total FSP Assists (Incidents/yr)	6,953			PM Peak		26.8
				Traffic Profile	User Defined	
Time Period				Daily/Annual		
Savings-Performance Measures	AM Peak	Midday	PM Peak	Savings-Performance Measures	Daily	Annual
Delay (veh-hrs)	704.5		1,739.0	Delay (veh-hrs)	2,443.49	618,204
Fuel Consumption (gal)	1,062.7		2,623.1	Fuel Consumption (gal)	3,685.83	932,515
Emissions				Emissions		
ROG (kg/day)	105.38		260.10	ROG (kg/day, kg/yr)	365.48	92,466
CO (kg/day)	4.42		10.91	CO (kg/day, kg/yr)	15.32	3,877
NOx (kg/day)	20.65		50.98	NOx (kg/day, kg/yr)	71.63	18,122
Cost Effectiveness				Cost Effectiveness		
Delay Benefits (\$/day)	\$	7,045	\$	17,390	\$	24,435
Fuel Benefits (\$/day)	\$	2,125	\$	5,246	\$	7,372
Total Benefits (\$/day)	\$	9,170	\$	22,636	\$	31,807
Cost of the FSP Service	\$	598	\$	797	\$	1,395
B/C Ratio(s)	15.33		28.39	B/C Ratio	22.79	

Table 4: Comparable FSP Beats in Riverside County – I-215 & I-15

Input Data				FSP Operational Parameters		
District	8			Delay Cost (\$/veh-hr)	\$ 10.00	
Analyst	M.Mauch			Fuel Cost (\$/gal)	\$ 2.00	
Date	January 20, 2007			Mean Response time w/o FSP (min)	30.0	
Beat # Name	18			FSP Response Time (min)		
Beat Description	I-215 (45.50 – 36.44)			AM Peak	3.6	
Beat Length (miles)	9.06			Midday		
Hours of Operation/ # FSP trucks	Start Time	End Time	# FSP Trucks	PM Peak	3.6	
	5:30	8:30	3	FSP Response Time Reduction (min)		
				AM Peak	26.4	
AM Peak				Midday		
Midday				PM Peak	26.4	
PM Peak	15:00	19:00	3	Traffic Profile	User Defined	
Number of Service Days/Yr	253					
Cost of FSP Service (\$/truck-hr)	\$ 47.34					
Total FSP Assists (Incidents/yr)	11,399					
Time Period				Daily/Annual		
Savings-Performance Measures	AM Peak	Midday	PM Peak	Savings-Performance Measures	Daily	Annual
Delay (veh-hrs)	698.0		1,169.4	Delay (veh-hrs)	1,867.42	472,458
Fuel Consumption (gal)	1,052.8		1,764.0	Fuel Consumption (gal)	2,816.87	712,667
Emissions				Emissions		
ROG (kg/day)	104.40		174.92	ROG (kg/day, kg/yr)	279.32	70,667
CO (kg/day)	4.38		7.33	CO (kg/day, kg/yr)	11.71	2,963
NOx (kg/day)	20.46		34.28	NOx (kg/day, kg/yr)	54.74	13,849
Cost Effectiveness				Cost Effectiveness		
Delay Benefits (\$/day)	\$ 6,980		\$ 11,694	Delay Benefits (\$/day, \$/yr)	\$ 18,674	4,724,577
Fuel Benefits (\$/day)	\$ 2,106		\$ 3,528	Fuel Benefits (\$/day, \$/yr)	\$ 5,634	1,425,334
Total Benefits (\$/day)	\$ 9,085		\$ 15,222	Total Benefits (\$/day, \$/yr)	\$ 24,308	\$ 6,149,911
Cost of the FSP Service	\$ 426		\$ 568	Cost of the FSP Service	\$ 994	\$ 251,508
B/C Ratio(s)	21.33		26.80	B/C Ratio	24.45	

Input Data				FSP Operational Parameters		
District	8			Delay Cost (\$/veh-hr)	\$ 10.00	
Analyst	J. Rivera, RCTC			Fuel Cost (\$/gal)	\$ 2.00	
Date	March 27, 2006			Mean Response time w/o FSP (min)	30.0	
Beat # Name	25			FSP Response Time (min)		
Beat Description	I-15 (40.36 – 52.27)			AM Peak	11.9	
Beat Length (miles)	11.91			Midday		
Hours of Operation/ # FSP trucks	Start Time	End Time	# FSP Trucks	PM Peak	11.9	
	5:30	8:30	2	FSP Response Time Reduction (min)		
				AM Peak	18.1	
AM Peak				Midday		
Midday				PM Peak	18.1	
PM Peak	15:00	19:00	2	Traffic Profile	User Defined	
Number of Service Days/Yr	253					
Cost of FSP Service (\$/truck-hr)	\$ 47.34					
Total FSP Assists (Incidents/yr)	5,893					
Time Period				Daily/Annual		
Savings-Performance Measures	AM Peak	Midday	PM Peak	Savings-Performance Measures	Daily	Annual
Delay (veh-hrs)	337.4		658.1	Delay (veh-hrs)	995.46	251,850
Fuel Consumption (gal)	508.9		992.7	Fuel Consumption (gal)	1,501.57	379,898
Emissions				Emissions		
ROG (kg/day)	50.46		98.43	ROG (kg/day, kg/yr)	148.89	37,670
CO (kg/day)	2.12		4.13	CO (kg/day, kg/yr)	6.24	1,579
NOx (kg/day)	9.89		19.29	NOx (kg/day, kg/yr)	29.18	7,383
Cost Effectiveness				Cost Effectiveness		
Delay Benefits (\$/day)	\$ 3,374		\$ 6,581	Delay Benefits (\$/day, \$/yr)	\$ 9,955	2,518,504
Fuel Benefits (\$/day)	\$ 1,018		\$ 1,985	Fuel Benefits (\$/day, \$/yr)	\$ 3,003	759,795
Total Benefits (\$/day)	\$ 4,392		\$ 8,566	Total Benefits (\$/day, \$/yr)	\$ 12,958	\$ 3,278,299
Cost of the FSP Service	\$ 284		\$ 379	Cost of the FSP Service	\$ 663	\$ 167,672
B/C Ratio(s)	15.46		22.62	B/C Ratio	19.55	

As illustrated in Tables 2-4, above, the emission reductions attributable to FSP beats operating in Riverside County have been quantified and documented by UC Berkeley. The average reduction in criteria pollutants for FSP beats are as follows:

*Table 5: Average Criteria Pollutant Reductions for Riverside FSP Beats*

ROG Emission Benefits (lb/day)	NO <sub>x</sub> Emission Benefits (lb/day)
383.9	75.2

**Project #2: New Freeway Service Patrol Service** – RCTC also proposes to implement a new FSP beat on Interstate 215 between Alessandro and SR 74. This new beat will be comprised of two (2) FSP service vehicles. Using the above methodology, it is anticipated that the air pollutant reductions attributable to the proposed new beat will exceed the average FSP beat in Riverside County, as shown in Table 6:

*Table 6: Average Criteria Pollutant Reductions for Riverside FSP Beats*

ROG Emission Benefits (lb/day)	NO <sub>x</sub> Emission Benefits (lb/day)
383.9	75.2

**Summary:** The proposed projects evaluated to date substantially mitigate the increase in emissions projected as a result of modifying HOV lane access on the SR-60. Table 7, below, illustrates the emission reductions attributable to the two (2) FSP projects.

*Table 7: Summary of Project Emission Reductions*

Project Description	ROG Emission Benefits (lb/day)	NO <sub>x</sub> Emission Benefits (lb/day)
Project 3: FSP Expansion – State Route 60	383.9	75.2
Project 4: New FSP Service – I-215	383.9	75.2
<b>TOTAL</b>	<b>767.8</b>	<b>150.4</b>

If you have any questions regarding the above assessments, please do not hesitate to contact me at [rgorski@pacbell.net](mailto:rgorski@pacbell.net).

**ATTACHMENT D**

**COMMENTS AND RESPONSES**

**Proposed Caltrans TCM Substitution  
Comments and Responses**

Commentor	Comment	Response
US EPA	The original TCM substitution report concluded that the part-time HOV achieved equivalent emission reductions as the original TCM when rounded to the nearest pound. US EPA commented that rounding to the nearest pound does not constitute equivalency.	SCAG worked with RCTC to develop substitute TCM projects to make up the difference in emission reductions and have included them on the Final TCM Substitution Report. The report documents that the two Freeway Service Patrol (FSP) projects (one on SR-60 and one on I-215) achieve the necessary reductions.
SCAQMD	The SCAQMD commented that any substitute project must be in a similar time frame to the modified TCM.	The proposed part-time HOV is expected to be operational by June 2007. The SR-60 FSP project will be operational by March 2007; the I-215 FSP project will be operational by July 2007. These TCM substitutions meet the requirement for similar timeframe.
SCAQMD	The SCAQMD commented that the substitute project(s) should have a nexus to the transportation facility of the original TCM.	Caltrans is proposing to convert an existing full time HOV lane to a part time lane in both directions on an eight mile segment of the SR-60. The proposed segment would begin just east of the SR-60 and I-215 junction and would continue to Redlands Boulevard. While there is no requirement for a TCM substitute project to have a nexus to the transportation facility of the original TCM, in this case, the FSP expansion on SR-60 and a new FSP beat on I-215 both have a direct nexus to the proposed SR-60 HOV substitution.
Caltrans Dist 7	As an initial response to US EPA's comment that additional substitute projects were necessary, RCTC proposed five projects including a parking structure at a Metrolink station in Corona. The commentor noted that this parking structure appears to be identified in the existing 2006 RTIP as a TCM, and thus questioned whether the project can be a viable substitute.	Subsequent to RCTC's initial identification of five substitute projects, it was determined that only two of the five projects were necessary to achieve equivalent emission reductions, and the parking structure is no longer being advanced as a TCM substitute for the proposed Caltrans HOV project.